Almost complete resolution of a lumbar disc herniation after lateral interbody fusion without posterior open decompression

Gautschi, Oliver P ; Stienen, Martin N ; Corniola, Marco V ; Molliqaj, Granit ; Tessitore, Enrico

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Almost complete resolution of a lumbar disc herniation after lateral interbody fusion without posterior open decompression: A case report

Oliver P. Gautschi, Martin N. Stienen, Marco V. Corniola, Granit Molliqaj, Enrico Tessitore

Department of Neurosurgery and Faculty of Medicine, University Hospital Geneva, Switzerland

Correspondence to:

Oliver P. Gautschi, MD
Département de Neurosciences cliniques
Service de Neurochirurgie
Faculté de Médecine
Hôpitaux Universitaires de Genève
Rue Gabrielle-Perret-Gentil 4
1211 Genève 14
Phone: +41 22 372 82 03
Fax: +41 22 372 82 25
Email: ogautschi@gmail.com

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Abstract:

The extreme lateral interbody fusion (XLIF) has become an increasingly popular approach for lumbar interbody fusion over the past decade, lowering the risk for large anterior vessel and bowel injury and avoiding damage to the posterior structures including the paraspinous muscles, facet joint complexes and tension bands. Thus, the XLIF technique became an alternative to conventional posterior and anterior lumbar fusion procedures. Amongst many others, foraminal stenosis with or without moderate spondylolisthesis is one of the main indications for a XLIF procedure. Herniated intracanal lumbar discs are regarded as a relative contraindication due to the inability to perform a direct decompression. Here, we report a case of an almost complete disappearance of a right-sided postero-lateral herniated lumbar disc after a XLIF procedure without additional posterior open decompression.

Key words: extreme lateral interbody fusion; herniated lumbar disc; spontaneous resolution; indirect decompression

Introduction

Minimally invasive spine surgery (MISS) techniques are becoming more and more popular all around the globe because of less traumatizing surgical approaches, less surgical site complications and faster postoperative recovery. As such, a lower infection risk, less damage of the soft tissue and less perioperative blood loss have been appreciated (1). Likewise, there is some evidence that MISS leads to faster postoperative mobilization, decreased peri- and postoperative pain medication and hence shortened hospital stay (1). Nowadays, the MISS technology can be used for a number of traumatic and degenerative conditions of the thoracic, lumbar and lumbo-sacral spine.

First introduced by Pimenta et al. in 2001, the MISS lateral retroperitoneal transpsoas approach, also known as extreme lateral interbody fusion (XLIF), has become an increasingly popular approach for lumbar fusion over the past decade. This lateral approach provides a wide exposure to the anterior part of the disc place with the ability to perform under direct vision an almost complete discectomy and subsequent interbody fusion. The posterior annulus, as well as the anterior and posterior longitudinal ligaments are left intact. Interbody distraction and placement of a large interbody cage helps to restore disc height and provides an indirect decompression of lumbar spinal and foraminal stenosis. It reduces the risk for large anterior vessel and bowel injury and avoids damage to the posterior structures including the paraspinous muscles, facet joint complexes and tension bands. For these reasons, XLIF might be an alternative to posterior and anterior approaches to lumbar fusion. Although initially used for patients with axial low back pain without severe central canal stenosis, the indication spectrum for an XLIF approach broadened subsequently over time. Today, possible indications include single or multilevel degenerative disc disease, adult scoliosis, grade 1 or 2 spondylolisthesis, lumbar spondylosis with instability, lumbar stenosis, adjacent segment disease, trauma, disc replacement revision surgery, pseudoarthrosis, tumorous and infectious processes of the spine and eventually herniated thoracic discs. Contraindications include significant central canal stenosis, significant rotatory scoliosis, and severe spondylolisthesis. Posterior, postero-lateral or lateral herniated lumbar discs (HLD) are usually regarded as relative contraindications for XLIF due to the inability to perform a direct decompression by the lateral approach.

Here, we report a case of an almost complete disappearance of an intraspinal posterolateral HLD after a XLIF procedure without posterior open decompression.

Case Report

We report the case of a 75-year old male patient, who presented with chronic lower back pain with irradiation into both buttocks and an intermittent radicular irradiating pain in the left leg. The patient's previous history include a bilateral selective decompression L4/5 due to a severe spinal stenosis and the implantation of an interspinous spacer device on the same level six years prior in another clinic. One year ago, the patient had a selective L3/L4 decompression on the right side with an "over the top" decompression of the contralateral side due to recurring L3/L4 right-sided lombo-cruralgia with evidence of spinal stenosis on this level. At presentation, the clinical examination showed a slight paresis M4/5 of the right gluteus and biceps femoris muscle without sensory deficits and without Lasègue sign on both sides. The lumbar magnetic resonance imaging (MRI) depicted a moderate stenosis on L2/3, a bilateral foraminal L3/L4 stenosis, as well as a postero-lateral HLD L3/4 on the right side with consecutive L4 nerve root compression (Figure 1). The MRI also revealed a grade 1 L4/5 spondylolisthesis without signs of instability in the additional dynamic flexion/extension images. Due to the absence of a right-sided cruralgia, we decided not to treat the L3/4 HLD on this side. So, we performed a double left-sided XLIF-procedure on L3/4 and L4/5 levels and a percutaneous L3-5 posterior fixation. Prior to hospital discharge, the postoperative lumbar MRI revealed a significant reduction of the size of the right-sided postero-lateral L3/4 HLD with radiological resolution of the L4 nerve root compression (Figure 2). The patient was discharged home a week later. He presented an uneventful postoperative recovery and a clinically meaningful improvement of the preoperative symptoms in the follow-up.

Discussion

This case report shows an almost complete resolution of an intraspinal HLD after a XLIF procedure without open posterior decompression that most likely resulted from indirect decompression. Usually, posterior and/or postero-lateral HLD are considered relative contraindications for a lateral approach, since a sufficient decompression cannot be guaranteed by this approach. In this case, however, we opted for the XLIF technique because our patient did not present any clinical signs of a corresponding L4-cruralgia in the right leg. As the HLD was clinically asymptomatic, we saw no reason to additionally treat this lesion, but hoped for a spontaneous resolution.

The literature supports our decision, as spontaneous regression of either herniated lumbar or cervical discs without specific treatment is a well-established phenomenon (2). Although the exact pathological mechanism is still not fully understood, three hypotheses have been suggested in the past; the first one assumes a restitution or

retraction of the hernia into the disc space. The second advocates dehydration of the herniated disc with subsequent volume reduction and the last and most investigated theory suggests inflammation and foreign body reaction towards the herniated disc, which finally leads to its fragmentation and phagocytosis. Supposedly, all three mechanisms in combination play a more or less distinctive role for the phenomenon of spontaneous regression.

Considering XLIF procedures in particular, the so-called indirect foraminal decompression by removing the disc and restoring the disc height can achieve astonishing results. Oliveira et al., for example, reported a substantial dimensional improvement in all radiographic parameters in 21 patients (43 XLIF procedures). They found an increase of 41.9% in average disc height, 13.5% in foraminal height, 24.7% in foraminal area and 33.1% in central canal diameter (3). Elowitz et al. obtained for 25 patients a benefice in clinical and radiographic evaluation; with a Visual Analgesia Scale (VAS) and Oswestry Disability Index improvement and an increase in dural sac dimension of 54% in the anterior-posterior plane and 48% in the medial-lateral plane ($p<0.00001$). Similar results have been shown by Kepler et al. in a study with 29 patients undergoing lateral transpsoas interbody fusion. These authors showed that the average foraminal area increased by 36.2 mm^2, respectively 35% of the preoperative area ($p < 0.01$). The average posterior intervertebral height increased by 70%, an effect that was enhanced by posterior placement of the intervertebral cage. Similar findings have been reported by Malham et al. studying 52 consecutive patients undergoing 79 levels of XLIF without additional posterior decompression. The authors reported a significant increase of the posterior disc height from 3.0 to 5.7 mm (89.0% increase), of the foraminal height from 1.4 to 1.7 cm (38.0% increase) and of the foraminal area from 1.1 to 1.4 cm^2 (45.1%).

Radiographic analysis of our patient depicted an increase in the posterior disc height from 3.5 to 6.5 mm (85.7% increase) and an increase of the foraminal height from 1.8 to 2.3 cm (27.8% increase). We thus conclude that the mechanism responsible for the spontaneous regression of the postero-lateral HLD in our patient most probably resulted from retraction related to ligamentotaxis due to an increase in postoperative disc height, which may stretch and tighten the annular fibers and so decreasing the disc bulge. The hypothesis of inflammation, fragmentation and phagocytosis seems less likely because of the short time between the surgery and the postoperative imaging.

Conclusion

We report a case of an almost complete disappearance of an intra-spinal postero-lateral HLD after a lateral interbody fusion (XLIF) without additional posterior direct decompression. Regression of HLD by retraction related to ligamentotaxis and indirect decompression from the lateral approach is thus possible. An asymptomatic HLD should, therefore, not be regarded as an absolute contraindication for an XLIF procedure in otherwise good candidates. Further studies are needed to identify the most suitable patients for indirect decompression.

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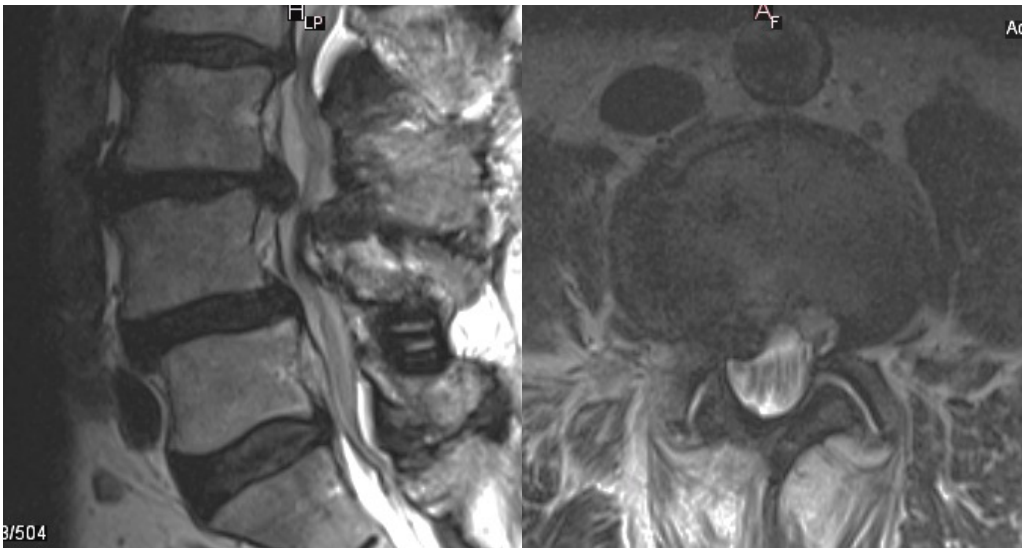
Figure legends

Figure 1. Preoperative lumbar T2 MRI (**A,** sagittal plane and **B**, axial plane) showing the asymptomatic right-sided postero-lateral herniated lumbar disc L3/4 with radiological L4 nerve root compression.

Figure 2. Postoperative lumbar T2 MRI (**A**, sagittal plane and **B**, axial plane) showing the almost complete resolution of the postero-lateral herniated lumbar disc L3/4 and some metal artefacts from the posterior percutaneous fixation.

Figure legends



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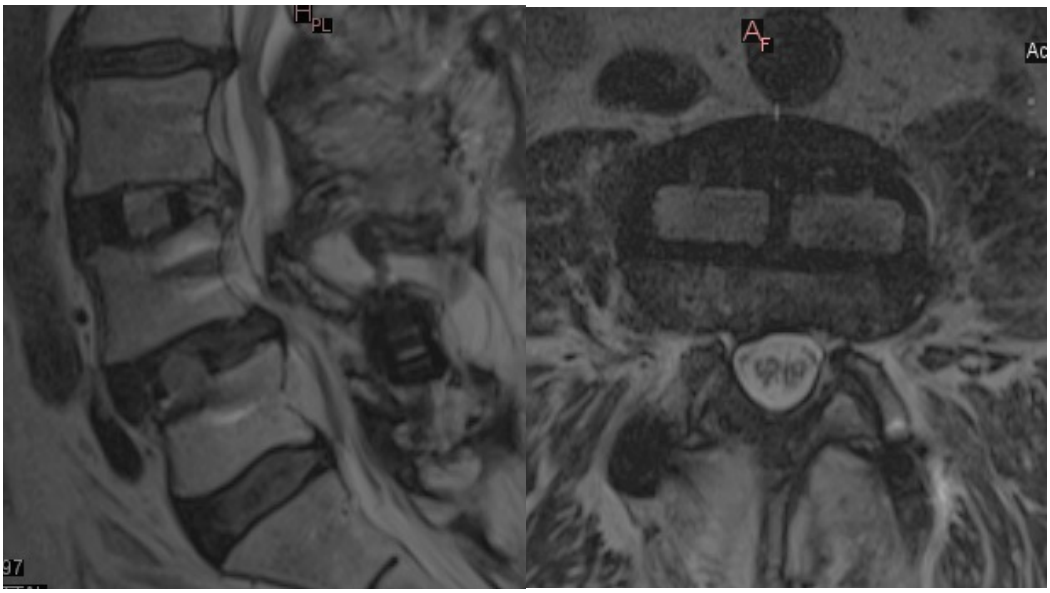

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